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The art of making fine prints.

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THE ART
OF MAKING
FINE PRINTS

"THE ART OF MAKING FINE PRINTS."

"*Fine Art is that which the hand, the head, and the heart of man go together.*" (Ruskin)

ABC

D.V

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THE ART OF MAKING FINE ETCHINGS.

ETCHING is "in the air." In the whole history of the world there were never so many beautiful plates made as there are to-day.

Fine impressions of plates by the "old masters" fetch a higher price in the market to-day than they ever did before—fine impressions of plates by modern, even living, masters fetch what would have been considered fantastic prices fifty years ago. Yet how many people who buy and—amongst the shrewd—collect them, know how and by what process they come into existence?

I propose, in the following notes, to tell those who care to read them, how I make an Etching. I say how I make an etching—because, although all etchings have a common basis, yet each etcher has something peculiar to himself which helps to make his work characteristic and personal.

What is an Etching?

An etching is not drawn with a pen and ink, and a pen-and-ink drawing is not called an etching—an etching must be printed from a metal plate. There are various kinds of metals that an etching may be made upon, namely, copper, zinc, steel or aluminium.

Metals

Copper is the one generally chosen, and it is difficult to imagine a better metal; it can be prepared to any degree of hardness or softness, and, lastly, owing to its beautiful colour, is a delight to work upon. Zinc is also a good metal, because lines worked upon this print with a peculiar richness of quality; it is, however, much softer than copper, and as a rule wears out sooner in the process of printing.

I will briefly explain the method for the production of an etching. A polished copper or zinc plate is covered with a wax preparation which resists acid, a steel point is used in drawing upon the plate, this point cutting through the wax and leaving the copper lines bare; an acid is applied to the plate, and it attacks or bites only where the steel point has cut through the wax. When the biting is completed the resisting wax coating is removed. A print is then obtained by dabbing a thick oily ink over the plate, and it is then wiped with a stiff muslin to remove the superfluous ink; the plate is then placed face upward on the bed of the etching press—the whole being passed between the rollers of the press under pressure. By this means the paper is pressed into the etched or bitten lines and draws out the ink deposited therein.

The Method

This appears to be a comparatively simple process—but it is not, and I may say that from taking up your polished copper plate, at the beginning, to the production of your proof at the end, there are a hundred and one technical difficulties, pitfalls and disappointments; on the other hand, the art exercises a tremendous fascination upon the worker.

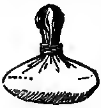
What you have to face

I begin an etching by being careful that my copper plate is finely polished, and before laying the wax ground, satisfying myself that it is perfectly clean and free from any trace of grease. This is done by thoroughly washing with fine whiting and water, dried with new tissue paper and finally a rub over with chloroform.

Polishing the Metal

I then place the plate upon a heater, under which is a Bunsen burner, and it is brought to such a heat that the wax ground (which is a hard ball) melts freely. A few dabs of the ground is sufficient; it is then evenly spread all over the surface with a dabber (a pad of cotton wool, covered with fine silk or kid), see sketch Fig. I., great care being taken that no specks of dust appear, and when properly dabbed, the copper appears as though it had been varnished with an even

Laying the Ground



. Dabber.
Fig. 1

Smoking the Ground

coat of transparent varnish. It would be almost impossible to see your design upon the plate in this condition, therefore the waxed surface must now be blackened. This is done by smoking. Whilst the plate is still hot it is held at the edge or the corner by a hand vice, and turned face downwards; the flame from a bunch of wax tapers is then passed over the wax surface, particularly avoiding the flame from resting on any part. This may burn the ground, and is fatal; the ground, when properly smoked, should present a jet black, glossy appearance. If it should in any way be burned, there will be patches of dull black, which will break away in the acid; therefore clean it off with turpentine and begin again.

The Screen

Drawing the Design upon the Metal

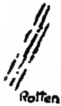
Transferring

I will assume that my ground is good. It is, therefore, ready for me to begin to draw my design upon it. I first of all adopt a screen to work behind. This is usually a frame covered with tissue paper and placed at an angle over the work bench, through which the light penetrates; this softens the glitter of the copper. It must be understood that the subject (if it is to be a portrait of a place or object) must be drawn in reverse upon the metal. This can be done by placing the drawing in front of a mirror and working from the reflection. Presuming I have made a pencil drawing of my subject, and I do not mind, in a way, spoiling this drawing, I transfer it completely to the blackened wax surface of the plate, by slightly damping the drawing, and passing it under very slight pressure through the printing press (the drawing being laid face down upon the grounded plate), the result being that I have a silvery grey drawing upon my wax ground, and this is now in reverse.

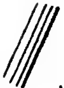
The Needle

I now begin to draw my design with the etching needle. This is usually a piece of steel sharpened to a point; it is very important in the manner it is sharpened. It must be just sharp

Drawing through the Wax



Rotten Lines Fig. II



Correctly drawn lines Fig III.

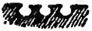
My Method of Drawing on the Plate

enough to draw a beautiful fine line, without in any way cutting or scratching the copper; it must just be so, that, with a certain amount of pressure, you get through the ground to the metal surface. Here I must carefully consider my process and feel sure that every line I make upon the waxed plate is laying the copper bare. If I do not use sufficient pressure and do not completely get through the ground, I am producing what is known as "rotten lines," broken lines, as in Fig. II. A correctly drawn line should be uniform from its beginning to its end, as in Fig. III. Every etcher who puts a needle to a plate must, in his mind, realise for the moment the technical process, and at the same time keep his objective in view; every line must be so placed and drawn upon the plate that it will produce a beautiful rich line when printed. As I suggested in my introduction, that each etcher has something peculiar to himself, I must here remark that I do not in any way complete the drawing of my design upon the plate before passing it to the acid bath for the first time. My method is this, and from many points of view I find it reliable: I begin to draw in my deepest passages and add my intermediate tones from dark to light during the process of biting. This practically dispenses with "stopping-out" varnish (a varnish used for painting over lines which are sufficiently bitten), and, not the least important, I have my complete design before me to the end.

Biting

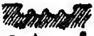
Now that I have drawn my design upon the metal as far as I wish, for the time being, it is ready to be etched or bitten in the acid. Before this is begun the back and edges of the plate must be protected; this is done by painting with ordinary Brunswick black (a strong resistant to the acid). I have, with very few exceptions, used nitric as my mordant, and find it very reliable. When the plate is immersed in the bath, it should be watched very carefully, and it will be noticed that the acid sets up a bubbling in the lines, which is clear proof that the action has started. These bubbles of air must be removed with either a feather or a piece of cotton wool. In cases where this action or bubbling occurs only in places or in patches, it is usually proof that in drawing upon the ground, the needle has not completely penetrated it, and the result will be very unsatisfactory. There is really no fixed rule for the duration of biting. As the acid acts quicker under higher temperatures, I take my plate frequently from the bath, wash and dry it and examine it. If the plate is held on a level with the eye and looked at against a diffused light so that the gloss of the black ground appears white, the bitten lines will appear black, and I can form a fair idea of its strength and depth; but to a very large extent it is gained by experience. It must be remembered that when the acid has bitten down below the surface of the wax it will begin to underbite, as shown in Fig. IV. Care must, therefore, be taken to avoid overbiting passages which are closely drawn or crossed hatched; the trouble arising from this will be that the surface between the lines will be bitten away, as shown in Fig. V., and the printed impression, instead of being a rich black, will appear grey.

Duration of Biting



Section of Etched lines
Fig. IV.

Overbiting

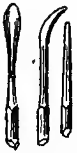


Section of Over-bitten lines
Fig. V.

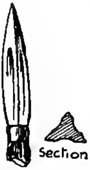
Should the complete design be drawn upon the plate before biting, the most delicate passages, or finest lines, are stopped out with varnish and so on until the strongest lines remain to the end. The wax ground is now cleaned off with turpentine, and you see for the first time upon the polished copper what you have been doing, up to now, practically in the dark. The result may give you immense pleasure, or it may be a terrible disappointment; there may be lines which are insufficiently bitten, and others which are bitten too deeply. To rectify those in the first case, the plate must be thoroughly cleaned, as in the first instance

Re-biting

of the laying of the ground, and the bitten lines filled in with a paste made of whiting and ammonia, the surface wiped clean, and a re-biting ground must be laid. I have seldom had to resort to this, but it is done by having an extra clean copper plate by you on the heater, and a fine leather-covered roller. A little wax etching ground is spread upon the extra copper plate (which is hot and melts the wax), the leather roller is rolled from side to side upon it until charged with a thin, even coating of the wax ground, it is then passed very lightly over the etched plate, until the surface is evenly coated with the ground, carefully avoiding that none of the ground is rolled into lines which are already charged with whiting. A slight dip in the acid bath will quickly remove all the whiting and leave the lines clean and ready for re-biting. The plate is taken out and washed, and all the parts that are sufficiently bitten are painted out with stopping varnish. In the case of over-bitten lines these may be reduced by means of the burnisher. This is a highly polished steel tool with ends of various shapes, see Fig. VI. By rubbing the over-bitten lines with a certain amount of pressure the burnisher will gradually close them up, and, if necessary, eventually remove them entirely. Erasions are more easily made upon metal than they are on, say, paper; removing anything from paper always destroys the surface, and this cannot be repaired, whereas upon copper, by means of a scraper, see Fig. VII., and burnisher, you can entirely remove any number of lines, and, should an indentation have been made on the surface of the metal, it is knocked up from the back, and the surface repolished. As long as there is copper there is hope.



Burnisher ends.
Fig. VI



Scraper.
Fig. VII

I have now arrived at the most exciting moment, that of taking a proof of my plate. The process of obtaining a proof is as follows: I must first "get ready" my paper. This means it must be damped some time before printing. It is better if it is done the night before, and kept from the air until ready for use. It should be in *Printing* a limp, not too wet, and not too dry state. Then I prepare or grind my ink; this I do upon an ordinary lithographic stone with a heavy muller. The ink is in dry powder form, usually Frankfort or French black, which may be warmed by the addition of a little umber or Japan red, according to what my plate demands. The ink is finely ground up with burnt oil. The plate is now placed upon the heater and brought to a gentle heat, to enable the ink to liquefy slightly and to be dabbed well into the bitten lines. The dabber that is used for this is fairly large, and is usually covered with felt. A piece of coarse muslin is used to wipe off the superfluous ink, and the wiping to follow it is a very delicate, careful operation, and requires a great amount of experience. Much skill is needed in leaving just sufficient tone, where tone is required. When I say tone, I mean that a certain amount of ink will always cling to the metal, and more or less can be left as the subject requires. If it is necessary to entirely remove this tone, it is done by charging the palm of the hand with ink, and further charging it with whiting; and by lightly passing the palm over the plate, the tone is lessened, and by further doing so it is entirely removed. Individual passages are treated in the same way by picking out high lights, etc., with the finger. The plate is then re-heated to again liquefy the ink, which is now cool, and a piece of very fine soft muslin is lightly drawn over the work, which causes the ink to be drawn up to the surface of the lines and slightly over the edges; this "fattens" or enriches the work considerably. It is not always advisable to adopt this operation, as there are so many plates which do not demand it. The edges of the plate are now wiped, and it is ready for the press. A copperplate press

The Copper-plate Press

consists of a frame supporting two solid steel rollers, between which a solid steel plank or bed travels to and fro when the press is brought into motion (all copper-plate presses are worked by hand). The plate is laid upon the bed, face up, and the damped paper upon the plate; several layers of blanketing are placed over these, and the whole is passed between the rollers under pressure. I am particularly fond of printing myself, and I think a proof looks its best immediately it is lifted from the press. It is only natural that, later, the ink becomes dry and loses some of that brilliancy it possesses whilst the paper and ink are wet. When dry—owing to the great pressure brought to bear upon the paper—the actual plate surface stretches, and as soon as the proof is dry it cockles. It must, therefore, undergo a process of flattening. There are different ways of doing this. The one I prefer is straining. This can be done immediately the proof is lifted from the press or at any other time. I do it in this way: whilst the proof is still damp, I lay it upon a drawing-board or a piece of ply-wood and bind the edges of the proof to the board with gummed brown-paper tape; as it gradually dries it contracts and strains like a drum. When dry it is cut off close to the brown tape; there has been no pressure on the proof and no crushing of the relief of the lines. This method is not practicable where there is a large edition of large proofs. They must then be placed between boards under pressure after the ink has been allowed to dry.

Flattening Proofs

Proofs should always be shown in a side or top light. This casts a shadow from the relief of the lines, and gives a much richer appearance to them; and they should always be carefully mounted before shown, and a correctly mounted proof should always have the lower margin of the mount greater than the top and sides. Unmounted proofs should not be lifted with one

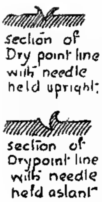
Handling of Proofs

hand; this is usually fatal. The proof is liable to be "cracked," and this in many cases is irreparable, especially if it occurs over the printed surface. Here the paper is compressed to a very great degree, and is brittle. Proofs are best lifted by the top left and bottom right-hand corners.

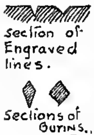
ALBANY E. HOWARTH, A.R.E.

THE ART OF MAKING FINE DRYPOINTS.

THE technique of drypoint is very simple. It consists of making a scratch upon a smoothly polished metal plate with a sharp-pointed piece of steel or a diamond; and that scratch, when printed, will be a surprisingly rich and beautiful line. Drypoint is a form of engraving, that is to say, it is worked upon metal without the aid of a wax ground or an acid bath. Drypoint and engraving are sometimes confused, but the difference is radical—a drypoint line cut upon metal dispenses with no metal, it only displaces it. It is similar to ploughing a field: the sharp-pointed needle cuts a furrow into the metal and at the same time raises a ridge (which is called the burr); see section of drypoint lines, Fig. VIII.


Section of Dry point line with needle held upright;
Section of Drypoint line with needle held aslant
Fig VIII

In engraving the line cut with the engraver's tool (called the burin) the metal displaced by the tool is entirely removed, except for a very slight burr at the edges, and the gradation of tones is produced by how deep or shallow the lines are cut. See section of burin lines, Fig. IX.


Section of Engraved lines.
Sections of Burins.
Fig. IX

Drypoint stands alone as a wonderful medium of expression; the line scratched or cut raises the ridge or burr, and it is the accumulation of ink against this burr that gives an extraordinary richness and throws a veil of mystery over the whole. On account of this it is frequently amalgamated with etched work. For those who do not readily distinguish the difference between an etching and a drypoint, I refer them to the difference of the two lines in Figs. VI. and VIII. This is easily observed in proofs by the aid of a magnifying glass.

ALBANY E. HOWARTH, A.R.E.

THE ART OF ENGRAVING "IN AQUATINT."

THE process of aquatint engraving was first practised in England by Paul Sandby, R.A. (1725-1809). It is an admirable tone process, and was largely used by the early water-colour painters to reproduce their water-colour drawings for use as drawing copies by their pupils.

Aquatint is frequently used in conjunction with etching, the composition being first etched on the copper plate before the aquatint ground is laid. Many of the early aquatint engravers adopted this method. When the subject is etched in line before the aquatint ground is laid, it is necessary to fill in the lines with printers' ink, which must be allowed to harden, in order to prevent the acid from attacking the lines again and becoming over-bitten during the subsequent immersions in the acid bath, while biting in the various tones.

There are two methods of laying aquatint grounds in general use at the present time; one by covering the plate evenly with powdered resin, or bitumen, and the other by dissolving resin in pure alcohol and floating the solution over the plate.

The dust ground is laid by placing the clean polished plate into a box, in which a cloud of finely powdered resin or bitumen has been raised by means of blow-bellows or a fan attached to a fly-wheel. The dust is allowed to settle evenly over the plate, and then it is removed carefully from the dusting box, and fixed by heating the plate over a gas burner sufficiently to melt the grains of powder to the plate. The grains of resin so fixed form the acid resist, so that the plate can only be attacked by the acid in the spaces between the resisting nodules of resin. Dust grounds are more commonly used than spirit grounds, because they can be laid with much more certainty.

The grain produced by the spirit ground is different in character from that of the dust ground, for when the solution is poured over the plate, the resin reticulates and leaves a very fine network of tiny channels of exposed copper in which the acid can act. The quantity of resin dissolved regulates the coarseness or fineness of the grain. The stronger the solution the larger the grain, so a weakened solution must be used for very fine grounds.

The quality of spirit grounds varies greatly, owing to their being affected by any moisture in the air, and by variations in temperature, but when the atmospheric and other conditions are favourable, and the ground is skilfully laid, the resulting aquatint ground will be brighter and will last longer in the printing than is the case with the dust ground, which is more fragile.

When a satisfactory ground has been obtained, the next step is to get the subject composition transferred to the plate. This is done either by drawing direct on the ground with a soft chalk or pencil, or by tracing over the design on paper, under which a piece of red or black oil transfer paper has been placed.

The subject will now be visible and ready for the various stages of treatment in the acid bath, after the edges and back of the plate have been carefully protected, by painting them over with a soft brush charged with "stopping out" varnish. The acid most commonly used is nitric, or nitrous, mixed with varying quantities of water, according to the requirements of the density of the aquatint ground.

Such parts of the subject as are to be left white are first stopped out with a sable brush and varnish, and the plate is put into the acid bath and the lightest tones are bitten. The action of the acid on the copper during corrosion causes minute bubbles of gas to form on the exposed parts of the metal, and these must be gently brushed off from time to time with a feather, or the tints will be bitten unevenly. When the tint is sufficiently bitten, the plate is removed from the acid and rinsed well with water and carefully dried with blotting paper. The light tones are now painted over with a stopping-out varnish, and when the varnish is quite dry, the plate is again put into the acid bath and the next degree of tone bitten in. These two processes of stopping out and biting are repeated until all the gradations of tone from the lightest tint down to a velvet black are obtained.

The plate gets darker with each successive biting, and the number and depth of the bitings it is possible to give depends on the resisting capacity of the ground, which gradually gets weakened under the action of the acid.

When the biting of the subject is complete, the plate is cleaned with turpentine, and a working proof is taken which will reveal the exact state of the plate.

Should some of the tones be found to be too dark, these can be reduced by the use of scrapers and burnishers, and many delicate gradations are obtainable by the use of these tools. On the other hand, if the plate be under-bitten, the tones can be reinforced by the laying of fresh aquatint grounds in the same manner as before, and then biting the weak tones again.

The whole process of aquatint engraving is very fascinating, and yields as much pleasurable excitement as any of the methods of artistic reproduction. It has been rightly said that every plate is an exciting adventure. The possibilities for experiment which the process affords, and the ever present element of chance, make it one of the most entertaining forms of artistic expression.

Aquatint is more allied to mezzotint than any other form of engraving, giving almost as wide a range of tones.

Both processes depend on the breaking up of the surface of the copper by a grain, in mezzotint made by means of a tool called a rocker, and in aquatint by resin, either in the form of dust or in solution as above described. But the lights and middle tints of a mezzotint are scraped away from the copper from dark to light, leaving the darkest parts of the plate untouched, while in the aquatint plate the lights are stopped out in gradation from the highest light, while the deeper the tone required, the longer it is left to the action of the acid.

It will be seen that the process of aquatint is capable of rendering a succession of flat and gradated tints very like those obtainable from washes of water-colour. It was this quality which made the process so acceptable to the early water-colour painters, and caused them to adopt it as a desirable means of reproducing their drawings and popularising that particular branch of art.

In modern times the art of aquatint engraving has been used by etchers and engravers more as a medium for the production of original works than as a method of reproducing works of art by the old masters; for which purpose mezzotint is better suited, and is a more reliable process.

Aquatint is undoubtedly a charming and effective medium of expression, capable of very varied individual treatment, both in the form of pure aquatint, and in combination with the etched line.

When it is the intention of the artist to use the aquatint process as a basis for printing in colour, it is necessary to bite the tones heavier than is required for printing in black or brown ink; otherwise the grain is not strong enough to hold the necessary quantity of colour to give rich effects.

An ordinary edition of, say, forty or fifty good proofs can be obtained from an average aquatint ground, but when a long edition of prints is required, it is necessary to have the plate steel-faced, to prevent the grain from wearing away too quickly during the process of repeatedly wiping the plate with the printing muslin. The "life" of an aquatint ground can be preserved to print large numbers by renewing the steel-facing from time to time when it displays signs of wear.

F. MARRIOTT.

THE ART OF MEZZOTINT ENGRAVING.

HOW the name "mezzotint" came to be used for this method of engraving will be seen from the description of how it is done. It consists of tints or tones as distinguished from lines.

As practised at the present time, the method is very much the same as that introduced to this country about two hundred and fifty years ago by Prince Rupert, as is shown by his proofs in the British Museum. Whatever elaborations were used at different times since, have now been abandoned.

To begin with, a perfectly flat and highly polished sheet of copper is obtained from the plate maker, who is a specially skilled workman. It is then roughened by hand all over with a ***rocking tool,*** so called from the rocking motion when in use. These ***rocking tools*** are usually two and half or three inches broad; and a coarse tool has forty, a fine tool one hundred and four points or teeth to the inch. A tool about half way between these extremes, about sixty-four teeth to the inch. is mostly used. The choice of tool depends on the size or minuteness of the details to be engraved. When the rocking tool has been "rocked" backward and forward a sufficient number of times in different directions, all trace of the original bright copper surface, with the exception of a few very minute specks, will have disappeared. This has required anything from forty to eighty different "ways" or directions of applying the rocking tool. If the plate at this stage were printed with a black ink the proof would show an even solid dense black.

On the plate thus prepared is drawn or traced as a guide the outlines of the subject to be engraved. The next stage is to make the gradation of tones from the deepest darks to the highest lights, according to the different degrees of light and shade in the picture. The tool used for this purpose is called a ***scraper,*** and is in shape not unlike a large surgeon's lancet, with both edges sharp, with a slight bevel.

The method of working from dark to light is the reverse of the usual practice of making darks on a lighter ground. In that respect it is similar to wood engraving, where the lights are cut away and only the lines left that are intended to print. Of course, there is the essential difference that the wood-cut is inked like type only on the surface, whereas in all copper-plate printing the ink is forced into the hollows and the surface wiped clean—the ink being extracted from the hollows to get an impression by the use of a very absorbent paper and great pressure.

Trial proofs are taken at different stages to ascertain exactly how the work is progressing. In the rare event of any part being over scraped it can be darkened with the rocking tool or a roulette, such as is used in etching.

When a satisfactory proof has been obtained a ***steel surface*** is put on the plate by electro deposition to save the wear of printing. As soon as there is any indication of the steel wearing through it is floated off with weak acid and a new steel face put on as before, so that the engraved surface is preserved, and the last impression printed of an edition is equally as good as the first.

What has been described is known as ***pure mezzotint,*** as distinguished from ***mixed mezzotint,*** The mixed method was sometimes used before steel surfacing was introduced, and consisted of ***biting*** in with acid the darks of the subject, which are the parts that wear first.

Mezzotint is eminently suitable for reproducing the relative tones and even the brush touch of a painting. It does not need to be translated into line as in line engraving. The special beauty of mezzotint is the density and strength of the darks where they are required. There is also a command of different textures and qualities of surface that can be suited to the varied parts of the picture. Thus the flesh, drapery, sky and foliage in the same picture can be variously treated, by use of the rocking tool and scraper. Photogravure, on the other hand, has one invariable texture or grain all over, without variety; nor are the darks in photogravure so beautifully rich.

The printing of an engraving in black and white requires great skill and experience. When it comes to printing in colours the same skill is intensified by the number of colours used. Each colour is separately worked into the hollows of the plate and the surface separately wiped clean.

In printing a figure subject the flesh colour must stop where the hair colour begins; the pink of the cheek must blend softly into the flesh tint, and the lips must be just the right colour and strength. And so throughout the whole plate: draperies, landscape and sky, all painted in and wiped, each with a variety of colours, and it has all to be done over again for each separate proof.

WILL HENDERSON.

THE ART OF ENGRAVING "IN STIPPLE."

STIPPLE is possibly the oldest method of engraving, and was practised by Agostino Demusis, known as Augustine of Venice, a pupil of Marc Antonio, who introduced this method into his plates between the years 1509-1536, but confined stipple to his flesh work only.

This method of engraving was, however, brought to great perfection at a somewhat later date, 1640-1703, by Gérard Audran, whose best-known work is "Les Batailles d'Alexandre."

Very much the same method is used in producing a stipple plate as is used in producing an etched plate. The effect in the former is produced by dots and the latter by lines.

In the first place, care must be taken to see that the plate is thoroughly cleaned and polished, a ground is then laid (just the same as for etching), the principal ingredients of which are virgin wax, mastic and asphaltum.

The work is then produced on the plate by varied and irregular dots, freely but carefully executed, commencing with the outline and working up the shadows, excluding the flesh and all delicate parts.

To give more atmosphere to foliage and landscape, dashes and lines are sometimes introduced by means of an etching point.

When a subject is finished the plate is prepared for biting. All the parts that are not to be bitten, viz., the flesh high lights and the back of the plate, are protected from the acid by being painted with a brush with "stopping out" varnish.

When dry the plate is ready for immersion in a bath containing nitric acid diluted with water. When the plate is sufficiently bitten it is taken from the bath and the etching ground removed by heating and cleaning with turpentine.

After the ground has been taken off, the dots are harmonized and softened by inter-stippling with a graver, specially ground for the purpose of making dots, which are of two kinds, "burr" and "plucked." The former is used for flesh and very fine work, and the latter for the bolder parts.

It is sometimes found necessary, after the plate has been re-stippled, to re-bite same, so as to obtain greater strength, but this is decided by the degree of light and shade in the subject in hand.

Subjects such as miniatures and delicate drawings are often stippled by the graver alone (without the use of acid), which produces a more delicate result.

Engraving in stipple is a very slow process, but peculiarly lends itself to the finest work and also to printing in colour on vellum.

L. DUPONT.

THE ART OF PRINTING "IN COLOUR."

EXPERIENCE is one of the greatest assets in "colour printing," and to succeed in this art it is necessary also for a printer to be able to both draw and paint, and to have gained experience in printing in black and white, and to have learned the various methods employed in printing mezzotint, etching, drypoint, aquatint, stipple and line plates, which take many years to acquire.

The printing of a plate in colour is a very important part of reproduction, and many failures are made through lack of experience and proper care in handling a plate correctly, so as to obtain the best artistic results.

The printer first inks the plate all over by means of a dabber, usually made from blanketing, or similar material. The plate is then wiped with a series of canvas cloths, a coarse canvas being used first, and the finest canvas last. More ink is left on some parts of the plate than others, according to the discretion of the printer. It is then that the real art of colour printing begins.

In the first place, the printer must have the necessary colours for printing any particular plate freshly ground, and mixed with good quality oil. These colours are then painted on the plate by means of a paper stump, and when the printer is satisfied that all the colours have been filled in, so as to produce an exact facsimile of the original picture, the plate is polished by means of a series of canvas cloths, very much in the same manner as when wiping off the foundation ink, and is usually finished by the printer using the palm of his hand.

During the process of filling in the colours the plate is heated from time to time by being placed on a flat bed of steel, which is constructed with a number of gas burners.

The plate is then passed through a high-pressure printing press, and it is then that the uninitiated are filled with amazement to find that enough colour had been left on the plate to produce such a wonderful result.

Good results can only be obtained with good material, and for that reason a printer should use as many transparent oils and colours as possible. Oils burnt by the printer and which contain no artificial ingredients are best, and colours ground freshly every day are essential, owing to the same losing their brilliancy when kept for any length of time.

Whenever possible the printer should study the original picture, so as to enable him to acquire the correct feeling and impression intended by the artist; but failing this, the printer should be supplied with a correct colour guide. It is then possible for an experienced printer to produce almost any result required by the engraver.

It is very seldom that two plates can be printed in the same manner, owing to the fact that one plate is almost certain to be engraved much deeper than the other, and if the same methods are used, one plate would print very much darker than the other.

The average number of colours used in printing a proof is usually about twenty, and the ink, the paper, the wiping, and the pressure of the press must all be varied according to the demands of the work in the plate.

It is advisable that the artist should engrave specially for printing in colours, which gives the printer a greater opportunity of producing correct results more quickly, and keeping the printing of the proofs more even.

The printing of mezzotints in colour has now been in vogue for many years, and is not a new process, method or discovery.

ARTHUR L. COX.

THE
ART OF PHOTO-MECHANICAL REPRODUCTIVE PROCESSES.

IT is seldom that the printer's art and the various processes by which original pictures are produced are understood by printsellers and the buying public. The following few fragmentary notes may serve to throw a little light on the methods of reproduction by photo-mechanical means. These can be broadly placed in three categories:

1. Relief;
2. Intaglio;
3. Planographic.

Line Blocks

The artist's drawing, which must be in line or stipple (not wash drawing), is taken and photographed: the negative, after development, is placed in contact with a piece of metal (usually *zinc*), which has been coated with a sensitized solution of albumen and bichromate of potassium: the *zinc* plate and negative are then exposed to light in somewhat the same way that the amateur photographer does his printing. Where the light penetrates through the negative on to the coating, it becomes hard. When sufficient exposure has been given, the metal plate is washed, the parts, which have not been acted upon by light, are washed away and the hard portions remain; these represent the design, which is then protected by an acid resist, and the plate immersed in an acid solution, which eats away the unprotected parts, leaving the design standing in relief. When this has been completed by numerous etches and finished off by deepening the blanks and cutting away all parts not required, the plate is fixed on to a piece of wood, bringing it to what is termed "type height": the block, as it is then called, can be printed along with a forme of type or singly as an illustration.

Half-Tone Blocks The procedure of obtaining the half-tone block is practically the same as that employed in the case of the line block; but when the original is photographed, a "screen," composed of two pieces of glass with diagonally engraved lines filled with a black pigment and sealed face to face, is placed between the sensitive plate (negative) and the lens of the camera. By this means an image of the original in the size required is recorded on the negative, but in a sort of "net" work. This negative, after the usual development, is printed on to a metal plate (usually copper) in the same way as a line block. The plate is then etched, with the result that the parts, which have been acted upon by light and which are hard, are not affected by the acid, only those parts of the plate which are unprotected are dissolved, leaving a number of "dots" standing in relief, smallest in the highest lights and increasing in size in the deeper tones, becoming practically solid in the blacks.

Tri-Chromatic Printing Tri-chromatic printing is a development of the half-tone process whereby the colours in an original painting and their component tints are scientifically separated. Theoretically, this is done by placing in the camera, in addition to the negative and half-tone screen, what is termed a colour filter, which may be said to be a piece of coloured optical glass, of which three or four may be used, according to the number of printing blocks to be made. The object of these filters is to keep back from being recorded on the negative all colours or tints which are not complementary to the colour in which the printing blocks are to be printed. A separate colour sensitive negative is made for each colour through a specially selected filter.

For the blue printing plate a red filter is used.
„ red „ „ a green „ „
„ yellow „ „ a blue „ „

For colour printing the ruled screen must be placed at different angles for each of the blocks. From these negatives plates are made in the same way as the half-tone block, and, when printed in correct register on a sheet of paper in the primary pigmentary colours—yellow, red, and blue—give an approximate rendering of the colours, tints, shades, tones and hues contained in the original picture.

The three-colour process has made possible the reproduction of many works of art at a price which brings copies of the best examples into homes which would otherwise have been impossible, at the same time meeting the demands of "commercialism" in regard to speed.

Intaglio In photogravure the reticulated ground is obtained by means of a "dust" grain (asphaltum or resin) deposited on to a copper plate through the medium of a box in which the "dust" has been agitated; when the heavier grains have settled, the plate is put in and receives a layer of fine dust, which provides the necessary ink-holding granulated ground.

A photographic print is taken on a film of sensitized gelatine, spread on a sheet of paper and mixed with a coloured pigment (usually red). The film is then transferred to the prepared copper plate, and when the sheet of paper and the gelatine, which is soluble, are washed off, leaves the hardened gelatine on the plate in various degrees of relief: this acts as an acid resist. A mordant is then used to etch away the parts of the plate not protected, or only partially protected. By this means a representation of the original is obtained below the surface of the copper plate in varying depths or "hollows."

Colour prints by this method are done by hand—that is, each tint is painted in separately in its proper place by means of "pencils." This is a beautiful process, and excellent results are obtainable; but it is a slow and comparatively expensive process, calling for great skill in the making of the plate and the printing, while the work is of a tedious and painstaking nature.

Recently the intaglio method of printing has been adapted for machine printing. "Gravure" prints can always be detected by means of the "screen" ground which takes the place of the resin grain.

Planographic Method

The third method whereby prints are obtained, as the name denotes, is a surface-printing one, including lithography and collotype. Unlike the previous processes, these may be called chemical processes, the principle of both being the antipathy of moisture to grease and grease to moisture.

When producing a chromo-lithographic print, a draughtsman, known as a lithographic artist, draws a key, outlining the various "patches" of colour as depicted in the original. Set-offs of this key are put on to as many stones as correspond with the number of printings. The litho artist has to prepare a separate stone for each of the colours in which he has decided to reproduce a representation of the original. The artist must possess a good sense of colour and an accurate knowledge of its analysis. In some of the old lithographic prints there are as many as twenty-five printings.

The method of obtaining prints is that the litho stone is damped, either by hand or mechanically, between each impression taken from the stone or plate, after which a roller with greasy ink is passed over the entire surface. It will be recognised that when this is done the design, which has been drawn in greasy ink, repels the water and the clean parts of the stone absorb it; therefore, it is only the parts of the stone bearing the design which accepts the ink. The sheet of paper is then brought into contact with the stone and subjected to pressure, thus a litho print is obtained.

Collotype Let me refer to what is probably the most delicate reproductive process, but still the most beautiful employed for the reproduction of colour subjects, a method which gives results unsurpassed by any other process when properly worked.

This reproductive process may be said to be a real photographic one—that is, there is no intervention of screen or grain. The necessary reticulation for printing is the natural grain of the sensitized gelatine film after exposure, which is so fine that it cannot be detected without the aid of a magnifying glass. Collotype can claim to be a "continuous tone" process.

A plate of glass about ½-inch thick is coated with a film of gelatine, which is sensitized and exposed under a reversed continuous-tone negative, which has to be delicately, artistically and laboriously prepared before using.

In the development of the exposed plate the parts which have been fully affected by light are rendered less water absorbent, whilst the other parts, according to the degree of light which has passed through the negative, are made more or less water absorbent. Thus the surface, which is an undulating one, is made by the action of light more or less water absorbent, and consequently resistant to ink. In this respect it is similar to lithography, although no damping of the plate is required.

The highest priced and best photo-mechanical colour reproductions are done by this method, and it is pleasing to record that no finer reproductions by this process are to be obtained than those done in this country.

J. R. RIDDELL.